



## Questions and Answers Hydraulic Fracturing

### Basic Information

**Q: What is hydraulic fracturing?**

A: The propagation of fractures in a rock layer caused by the action of a pressurized fluid.

**Q: Why is hydraulic fracturing needed?**

A: To increase the flow of oil or gas from the reservoir rocks to the producing well.

**Q: Why are such high pressures needed for hydraulic fracturing?**

A: The fluid pressure must exceed the lithostatic pressure, or the weight of the overlying rock, plus the rock strength. As a result, deeper layers and stronger rocks require more pressure.

**Q: Is hydraulic fracturing a recent invention?**

A: No, it has been used since 1947 on oil and gas wells as well as some water wells that depend on fracture flow instead of an aquifer layer.

**Q: If hydraulic fracturing has been around so long, what happened in the last few years that caused it to be in the news so often?**

A: Technological advances in the last 20 years allowed horizontal drilling to become very efficient, and multi-stage hydraulic fracturing in these wells allows significant production from non-conventional oil and gas resources. This has caused a modern oil and gas boom in several states. New fracturing techniques and high oil and gas prices also encouraged development of these resources that were previously overlooked.

**Q: What are non-conventional oil and gas resources?**

A: Resources that require more than the conventional well drilling and production activities. These include:

- Shale gas, such as found in the Marcellus Shale in Pennsylvania, the Barnett Shale in Texas, or the Fayetteville Shale in Arkansas.
- Shale oil, such as found in the Bakken Shale of North Dakota and Montana.
- Coal bed methane, such as found in Alabama, Colorado, and Wyoming.
- Tight sandstone for oil or gas, such as found in the Pavillion Field of Wyoming, is also a non-conventional resource. Instead of horizontal wells, however, it is produced through very densely spaced (5 to 10 acre) vertical wells that are fractured with specially designed fluids. The term “tight” refers to the lack of permeability due to natural cementing agents in the sandstone.

**Q: Does Idaho have shale gas or coal bed methane resources that require horizontal wells and multi-stage hydraulic fracturing?**

A: These resources have not been discovered in Idaho, so horizontal drilling has not occurred and is not being proposed. The gas resource discovered in Payette County is a conventional natural gas reservoir similar to hundreds of others developed across the U.S. These types of resources generally do not have the issues that been reported over the last few years. The well spacing in the Payette County field is 640 acres, and the sandstone reservoirs are not tight.

**Q: Does Idaho have tight gas reservoirs?**

A: The only commercial gas discovery in Idaho is the field being developed in Payette County. It is a conventional reservoir, and is not a tight sandstone.

**Q: So why then is hydraulic fracturing listed in the rules in Idaho?**

A: Hydraulic fracturing treatments are needed to clean out the drilling muds from the reservoir rocks adjacent to the well bore. The oil and gas reservoir by itself does not need fracturing to stimulate production, but the drilling muds used to create the well soaked into the oil and gas reservoir and are preventing the gas from flowing freely into the casing. This is a very small hydraulic fracture to unclog the reservoir next to the vertical oil and gas well. The fractures should only extend 150 feet from the well. To date, Idaho has not received any applications for hydraulic fracturing.

**Q: Are the rules sufficient to address shale gas or other non-conventional resources if they are discovered in Idaho?**

A: Yes. The rules are comprehensive enough to cover these activities. Some provisions were included that allow additional information to be required if the proposed activities include non-conventional oil and gas development.

**Q: Will Idaho have a boom like North Dakota is currently experiencing?**

A: Probably not. The North Dakota Bakken Shale fields produce oil, which is selling for about \$40/barrel. The Payette County discovery is mostly gas, which is selling for about \$3/thousand cubic feet. Abundant supplies of natural gas will keep this price low for the foreseeable future. Idaho will certainly benefit from the natural gas production, but it will be modest compared to that seen in other producing western states.

**Q: Has hydraulic fracturing occurred yet in Idaho for oil and gas?**

A: No. To date, Idaho has not received any applications for hydraulic fracturing.

## **Ground Water and Hydraulic Fracturing**

**Q: What is in the fluid used for hydraulic fracturing?**

A: It depends on the oil and gas reservoir depth, geology, and other physical characteristics. It also depends greatly on the objective of the hydraulic fracturing treatment. Following is a list of the common types of materials that are often used. Other materials are used as needed, some due to site specific conditions or needs.

- Carrier fluid, usually water, to pressure up and create the fractures.
- Proppant to hold the fractures open (sand, ceramic beads, etc.).
- Thickening agent to increase fluid density and allow proppant to be carried along.
- Crosslinker to increase temperature range of thickening agent.
- Friction reducer to allow fluids to be pumped more efficiently.
- Biocide to kill potentially harmful bacteria.
- pH adjuster to keep other materials functioning.
- Breaker to slowly break down the gelling agents.
- Surfactant to increase fluid recovery.

**Q: Is diesel used for hydraulic fracturing?**

A: Not legally after 2005. As detailed in a congressional report by Representative Waxman, several companies did continue using diesel from 2005 through 2009. These were essentially unpermitted Class II injection wells that the EPA has not acted on.

**Q: Will toxic chemicals be used in Idaho?**

A: Toxicity is based on dosage and response. Idaho water quality standards for surface and ground water must be followed, so nothing can be placed in groundwater that will exceed the water quality standards established by the Department of Environmental Quality.

**Q: The website [www.FracFocus.org](http://www.FracFocus.org) is difficult to maneuver. Why can't IDL post the information on its website?**

A: Most companies operate in multiple states. Having them report to a centralized database allows the public to go to one site to track a specific company or to track trends in various states. The Groundwater Protection Council is currently redesigning the FracFocus website to make it more user friendly.

**Q: Why can't industry be required to list all ingredients rather than it being a systems approach of reporting?**

A: Idaho Code (Title 9) protects specific formulations under proprietary information. A systems approach is a decoupling of trade names and percentages to allow for full disclosure of chemical ingredients, without the possibility of reverse engineering the proprietary blend.

**Q: Will hydraulic fracturing fluids be put into the ground water?**

A: Not into ground water as most people define it. The hydraulic fracturing fluids are only used in the target oil and gas reservoir. The well must be tested prior to the fracture treatment to make sure it is constructed properly and will not leak into the rocks above the target oil and gas reservoir. The rules also require that fractures be kept at least 500 vertical feet above and below the lowest fresh water aquifer as an added measure of protection. Due to the rock stresses at depth, fractures grow farther horizontally than they do vertically. The oil and gas reservoirs may also contain some water, but that water likely contains

elevated total dissolved solids and other naturally occurring materials that make it unsuitable for use.

**Q: What causes most of the problems associated with water contamination from hydraulic fracturing?**

A: Studies recently published in the National Academy of Sciences confirm eight (8) contamination cases (Pennsylvania & Texas) were a result of poor oil and gas well construction, specifically with cement seals and casings. Mismanagement of fluids on the surface can also contaminate. These problems are not a direct result of the hydraulic fracturing itself, but are due to poor oil and gas practices. The rules for Idaho address both of these issues better than most other state regulations. Some states require reporting after a fracture treatment, but the Idaho rules require application, agency review and approval, and reporting.

**Q: Will hydraulic fracturing make natural gas come out of people's faucets?**

A: No, unless the oil and gas well is not properly constructed. The rules require testing of a well's construction to make sure it will not leak into the shallow aquifers used for domestic water. Some water wells already have problems with natural gas due to improper water well construction or naturally occurring biogenic gas in the shallow subsurface.

**Q: What is biogenic gas?**

A: Biogenic gas is produced by microbial bacteria and is a naturally occurring phenomenon. A stable isotope analysis will distinguish it from thermogenic gas, which is what the oil and gas operator is trying to produce. Thermogenic gas is buried deeper and has gone through a natural maturing process due to the earth's heat.

## **Water Usage**

**Q: If hydraulic fracturing were to ever take place in Idaho would it use up large volumes of fresh water?**

A: No. The process only uses approximately 3% of the volume used in multi-stage horizontal fracture treatments. Only about 30,000 gallons of fluid is needed per treatment. This is equivalent to about 1.5 to 2 swimming pool volumes. If several wells will be treated in succession, then it is possible that the fluid can be reused.

**Q: Can the oil and gas operator just pump out some groundwater and use it for the hydraulic fracturing?**

A: No. A valid water right must be used. The small volumes needed can easily be purchased from nearby landowners or municipalities.

## **Earthquakes**

**Q: Does hydraulic fracturing cause earthquakes like those in Ohio and Arkansas?**

A: No. While it does produce micro quakes of magnitude two or less on the Richter scale, these quakes cannot be felt and do not cause damage. Earthquakes with magnitude 3 to 5 can be caused by deep injection wells used to dispose of fluids. These quakes can be felt and may cause minor damage. Injection wells used to dispose of hydraulic fracturing fluids likely caused quakes in Ohio and Arkansas. These Class II injection wells are not required to consider seismic impacts when they are approved. Deep injection wells, using a variety of fluids, have been a known source of earthquakes since the 1960s.

**Q: Will these Class II injection wells be used in Idaho?**

A: The Idaho Department of Water Resources is seeking program approval from the Environmental Protection Agency for Class II injection wells. This program will probably not be active until 2019 at the earliest. Until that time, no Class II injection wells may be permitted or used in Idaho.

## **Fluid Disposal**

**Q: If Class II injection wells cannot be used, how will the fracturing fluids be disposed of?**

A: They must be tested after the hydraulic fracturing to determine if the fluids picked up any harmful constituents during the fracture treatment. The operator must then dispose of the fluids at an appropriate facility. The fracture fluids proposed to be used in Payette County could likely be disposed of at the Clay Peak Landfill near the town of Payette. Used oil and gas drilling fluids have already been disposed of at this facility. If the fracture fluids cannot be disposed of at that location, they must be hauled to Envirosafe or some other facility. Evaporation could reduce the fluid volumes and require less material to be disposed of.

**Q: What harmful constituents could the hydraulic fracture fluids obtain during the process?**

A: It depends on the specific geology of the gas reservoir. In other states, fracture fluids have picked up chlorides and other salts that make disposal difficult. Some fluids have picked up naturally occurring radioactive materials, which are also difficult to dispose of.

**Q: Can infiltration pits be used for disposal?**

A: No. All pits used for oil and gas exploration and development must be lined.